

Toftdahl Drum Site Ground Water Monitoring Round VIII, July 17, 1995

Summary

This document is one of a series describing the results of ground water sampling at the Toftdahl Drums site near Vancouver, Washington (Chern, 1990; Marti, 1990 - Marti, 1995). Ground water samples were collected from four domestic water supply wells located near the former Toftdahl Drum Site on July 17, 1995. This sampling is part of the routine ground water monitoring conducted at the site since 1987. Samples were collected and analyzed for chromium, copper, lead, and zinc. Low concentrations of copper and zinc were detected in the domestic wells. These concentrations were all well below state and federal drinking water standards. Observed concentrations are consistent with previous sampling results; copper and zinc are the only analytes that are regularly detected in the private wells. These occurrences are probably related to well construction and plumbing materials.

Site Background

In the early 1970s, about 200 drums containing unknown quantities and types of waste were cleaned for resale on the Toftdahl property. Approximately 50 drums contained residual industrial wastes and could not be sold. These drums were buried on-site (see Figure 1). In 1985, the buried drums and wastes were removed. A Remedial Investigation conducted after drum removal concluded that no significant soil or ground water contamination existed. Ecology has conducted routine ground water monitoring at the site since 1987. Ground water monitoring was conducted for all priority pollutants semi-annually for five years, ending in April 1991. Currently, samples are collected annually from four domestic water supply wells located near the former Toftdahl Drum Site. Each year the sample program is re-evaluated to determine if it should be expanded based on the current year's sampling results. Routine monitoring is scheduled for the next five years, ending in 2001 as required by the Record of Decision. At the completion of the monitoring period, if no contaminants are observed other than copper, zinc and lead, long-term monitoring should be discontinued.

The hydrogeology of the site was described in detail in the Final Remedial Investigation (Dames & Moore, 1986) and is summarized as follows. Based on on-site well logs, two aquifer systems, designated the "shallow" (7 to 30 feet) and "deep" (69 to 98 feet) aquifers, have been identified beneath the Toftdahl Drum site. All four of the domestic wells that are sampled are drilled in the deep aquifer and range in depth from 72 to 110 feet. Both the shallow and deep aquifer systems consist of several discontinuous water-bearing zones separated by layers of clay and silt. The Boone well is considered to be upgradient of the site and the Bedoff, Homala and Kyle wells downgradient. Figure 1 shows the locations of the sampled wells and the approximate ground water flow direction.

Results

Field Observations

Table 1 lists field observation data: pH, temperature, specific conductance and purged volume. The average temperature was 12°C and pH ranged from 6.5 to 6.9, which are typical values for western Washington. Specific conductance ranged from 88 to 125 umhos/cm which represents ground water with low dissolved solids.

Laboratory Results

Table 1 summarizes laboratory results. Low concentrations of copper and zinc were detected in both the up- and downgradient wells. These concentrations were all below state and federal drinking water standards (Table 1). Observed concentrations are consistent with previous sampling results; copper and zinc are the only analytes that are regularly detected (Table 2). The laboratory reporting sheets are presented in Appendix A.

Methods

Ground Water Sampling

The four domestic wells were sampled from upgradient (Boone) to downgradient (Bedoff, Homala, and Kyle). Prior to sample collection, domestic wells were purged by allowing taps to run until pH, temperature, and specific conductance measurements stabilized. Samples were then collected from the tap nearest the well. All wells were sampled for selected total metals including chromium, copper, lead and zinc. Metal samples were preserved with 1 mL of nitric acid to a pH<2.

Chain-of-custody procedures were followed in accordance with Manchester Laboratory protocol (Ecology, 1994). All samples were analyzed by the Ecology/EPA Laboratory in Manchester. Samples were analyzed for total recoverable metals using EPA Methods 200.7 and 239.2 (EPA, 1983).

Quality Assurance

Randy Knox of Manchester Laboratory evaluated laboratory quality assurance. His memorandum and the quality assurance results are included in Appendix A. The quality of the results are good with the following exceptions. The detection level for copper was raised to reflect uncertainty about possible carryover. Sample results qualified with a "P" indicate the analyte was detected above the instrument detection limit but below the minimum quantitation limit. The minimum quantitation limit for metals is ten times the instrument detection limit. All spike recoveries were within acceptable limits of 75-125%. Relative percent difference (%RPD) for a spike and spike duplicate was within $\pm 20\%$.

In addition to laboratory calibration standards and method blanks, field quality assurance samples consisted of a blind duplicate. A blind duplicate sample, labeled "Smith", was collected from the Kyle well. Duplicate samples are two sets of samples collected from a well at the same time and submitted to the laboratory with different identification. The relative percent difference of the blind duplicate samples (Kyle and Smith) was within $\pm 10\%$, and satisfying data quality objectives.

References

Chern, L., 1990. Toftdahl Drum Site Monitoring Round I - October, 1989. Department of Ecology - Environmental Investigations.

Dames and Moore, 1986. Final Report Remedial Investigation for the Toftdahl Drum Site. Volumes I&II, July 17, 1986.

Marti, P., 1990. Toftdahl Drum Site Monitoring Round II - April, 1990. Department of Ecology - Environmental Investigations.

Marti, P., 1991. Toftdahl Drum Site Monitoring Round III - October, 1990. Department of Ecology - Environmental Investigations.

Marti, P., 1992. Toftdahl Drum Site Monitoring Round IV - April, 1991. Department of Ecology - Environmental Investigations.

Marti, P., 1992. Toftdahl Drum Site Monitoring Round V - April, 1992. Department of Ecology - Environmental Investigations.

Marti, P., 1993. Toftdahl Drum Site Monitoring Round VI - April, 1993. Department of Ecology - Environmental Investigations.

Marti, P., 1995. Toftdahl Drum Site Monitoring Round VII - June, 1994. Department of Ecology - Environmental Investigations.

U.S. Environmental Protection Agency, 1983. Methods for the Chemical Analysis of Water and Wastes. Environmental Monitoring and Support Laboratory, March, 1983.

Washington State Department of Ecology, 1994. Manchester Environmental Laboratory - Laboratory Users Manual. Edited by D. Huntamer and J. Hyre.

Contacts

Pam Marti Washington State Department of Ecology
 Environmental Investigations and Laboratory Services
 Toxics Investigations Section
 (360) 407-6768

For additional copies of this publication, please contact Ecology's Publications Distribution Office at (360) 407-7472 and refer to publication number 95-353.

The Department of Ecology is an equal opportunity agency and does not discriminate on the basis of race, creed, color, disability, age, religion, national origin, sex, marital status, disabled veteran's status, Vietnam Era veteran's status or sexual orientation.

If you have special accommodation needs or require this document in alternative format, please contact Joan LeTourneau at (360) 407-6764 (voice) or (360) 407-6006 (TDD).

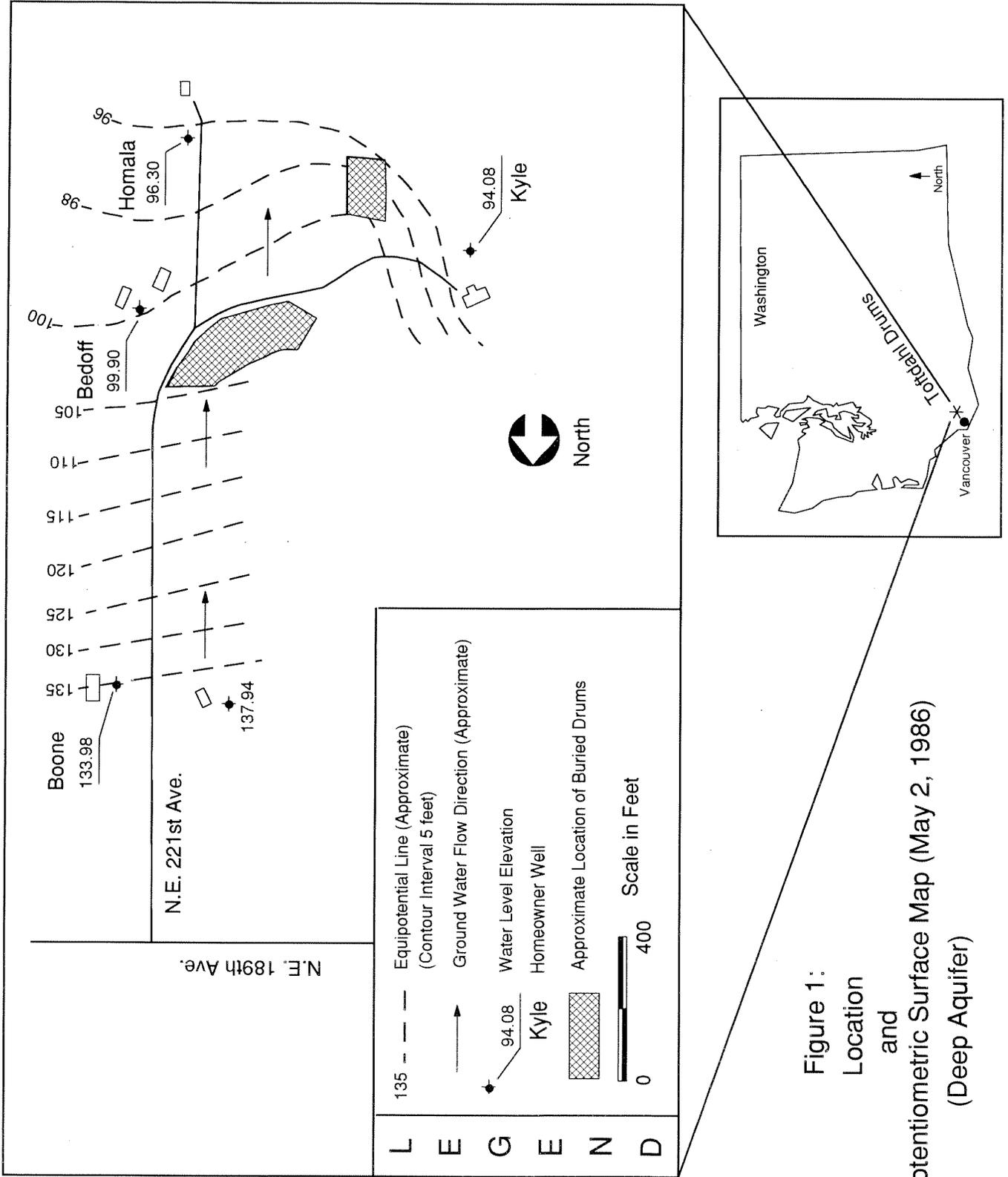


Figure 1:
Location
and
Potentiometric Surface Map (May 2, 1986)
(Deep Aquifer)

Table 1: Summary of Field Parameters and Detected Analytes from July 17, 1995

Location	pH (s.u.)	Temperature (°C)	Specific Conductance (umhos/cm)	Purge Volume (gallons)	Copper (ug/L)	Zinc (ug/L)	Lead (ug/L)	Chromium (ug/L)
Boone	6.5	12.2	95	100	41.7 P	47.3	1.0 U	5.0 U
Bedoff	6.9	12.0	125	100	33.4 P	4.0 U	1.0 U	5.0 U
Kyle	6.8	12.5	88	150	31.9 P	19 P	1.0 U	5.0 U
Smith (duplicate)	--	--	--	--	34.8 P	21 P	1.0 U	5.0 U
Homala	6.8	12.5	95	110	12 P	22 P	1.0 U	5.0 U
Maximum Contaminant Level (MCL)	--	--	--	--	1000 **	5000 **	50 *	50 *

U: The compound was not detected at or above the associated numerical value.

P: Analyte detected above the instrument detection limit but below the minimum quantitation limit.

--: Not Analyzed

*: Primary Maximum Contaminant Levels (MCL) are based on chronic and acute health effects.

** : Secondary Maximum Contaminant Levels (MCL) are based on aesthetic factors such as taste.

Table 2: Summary of Sampling Results from September 1988 to July 1995

	Boone	Bedoff	Kyle	Smith	Homala	MCL's
September 12, 1988						
Copper	76	121	42	--	--	1000**
Zinc	389	6	52	--	--	5000**
October 17, 1989						
Copper	50	50	30	--	ND	1000**
Zinc	290	ND	20	--	20	5000**
Mercury	0.06 U	0.06 U	0.1 B	--	0.16 B	2.0*
April 11, 1990						
Copper	77.6	37.6	46.1	46.1	3.3 J	1000**
Zinc	160	5.0 U	31 B	22 JB	80.3	5000**
Mercury	0.05 J	0.08 J	0.04 J	0.02 U	0.04 J	2.0*
October 23, 1990						
Copper	83.9	45.9	25.8	28.4	2.0 U	1000**
Zinc	480	6.2 JB	12 JB	15 JB	34.0	5000**
Chromium	6 J	5.0 U	5.0 U	5.0 U	5.0 U	50*
Lead	1.1 J	1.0 U	1.0 U	1.0 U	1.5 J	50*
April 23, 1991						
Copper	120	58.4	64.1	61.9	2.0 U	1000**
Zinc	178	5.5 J	19 J	22	64.3	5000**
Lead	1.2 J	20 U	2.4 J	NAR	NAR	50*
April 14, 1992						
Copper	50.5	48.8	45.1	45.0	7.4 P	1000**
Zinc	112	4.0 U	26	25	55.4	5000**
Lead	1.0 U	2.7	1.0 U	1.0 U	1.0 U	50*
April 6, 1993						
Copper	41.5	32.4	61.6	64.5	4.0 P	1000**
Zinc	91.8 B	4.0 J	37.4 B	38.4 B	56.2 B	5000**
Lead	20 U	50*				
June 21, 1994						
Copper	54.8	40 P	37 P	42.1	6 P	1000**
Zinc	86.8	4.0 U	22 P	23 P	17 P	5000**
Lead	1.9 P	1.0 U	2.1 P	1.0 U	1.0 P	50*
July 17, 1995						
Copper	41.7 P	33.4 P	31.9 P	34.8 P	12 P	1000**
Zinc	47.3	4.0 U	19 P	21 P	22 P	5000**
Lead	1.0 U	50*				

--: Not analyzed

J: Estimated Value

ND: Not Detected

U: The compound was not detected at or above the listed numerical value.

B: Analyte was also found in an analytical blank.

P: Analyte detected above the instrument detection limit but below the minimum quantitation limit.

*: Primary Maximum Contaminant Levels (MCL) are based on chronic and acute health effects.

** : Secondary Maximum Contaminant Levels (MCL) are based on factors such as taste, odor or color.

APPENDIX A

Analytical Results
Toftdahl Drums
July 17, 1995



STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

MANCHESTER ENVIRONMENTAL LABORATORY

7411 Beach Drive East • Port Orchard, Washington 98366-8204 • (360) 871-8860 • FAX (360) 871-8850

August 1, 1995

TO: Pam Marti, Project Officer

FROM: Randy Knox^{RMK}, Metals Chemist

SUBJECT: Metals Quality Assurance memo for the Toftdahl Drums Project
Sample Numbers 95298030- 95298034

QUALITY ASSURANCE SUMMARY

Data quality for this project is generally good. There was some problem of copper carryover to subsequent samples. The copper detection level was raised to 7 $\mu\text{g/L}$ to reflect uncertainty introduced by carryover.

SAMPLE INFORMATION

The samples from the Toftdahl Drums project were received by Manchester Laboratory on 7/19/95 in good condition.

HOLDING TIMES

All analyses were performed within the USEPA Contract Laboratory Program (CLP) holding times for metals analysis (28 days for mercury, 180 days for all other metals).

INSTRUMENT CALIBRATION

Instrument calibration was performed before each analytical run and checked by initial calibration verification standards and blanks. Continuing calibration standards and blanks were analyzed at a frequency of 10% during the run and again at the end of the analytical run. All initial and continuing calibration verification standards were within the relevant USEPA (CLP) control limits. AA calibration gave a correlation coefficient, r , of 0.995 or greater, also meeting CLP requirements.

PROCEDURAL BLANKS

The procedural blanks associated with these sample show no contamination at the reported detection level. Note that the detection level for copper was raised due to uncertainty caused by carryover.

SPIKED SAMPLE ANALYSIS

Spiked and duplicate spiked sample analyses were performed on this sample set. All spike recoveries are within the CLP acceptance limits of $\pm 25\%$.

PRECISION DATA

The results of the spiked and duplicate spiked samples are used to evaluate precision on this sample set. The Relative Percent Difference (RPD) for all analytes is within the 20% CLP acceptance window for duplicate analysis.

LABORATORY CONTROL SAMPLE (LCS) ANALYSES

LCS analyses are within the windows established for each parameter.

Please call Bill Kammin at Scan 360-871-8801 to further discuss this project.

RLK/rlk

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Toftdahl Drums

LIMS Project ID: 2008-95

Sample: BLN52508

Method: EPA200.7

Blank ID: WPB2970

Date Prepared: 07/21/95

Matrix: Water

Project Officer: Pam Marti

Date Analyzed:

Units: ug/L

Analyte	Result	Qualifier
---------	--------	-----------

Chromium	5	U
----------	---	---

Copper	7	U
--------	---	---

Zinc	4	U
------	---	---

Authorized By: _____

Release Date: 7/21/95

Page:

1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Toftdahl Drums

LIMS Project ID: 2008-95

Sample: LCS52588

Method: EPA200.7

Blank ID: LCS2971

Date Prepared: 07/21/95

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 07/26/95

Units: ug/L

Analyte	Result	Qualifier
Copper	107	%
Zinc	101	%
Chromium	101	%

Authorized By: 

Release Date: 7/26/95

Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for Inductively Coupled Plasma

Project Name: Toftdahl Drums

LIMS Project ID: 2008-95

Sample: 95298030

Date Received: 07/19/95

Method: EPA200.7

Field ID: BOONE

Date Prepared: 07/21/95

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 07/26/95

Units: ug/L

Analyte	Result	Qualifier
---------	--------	-----------

Chromium	5	U
Copper	41.7	P
Zinc	47.3	

Authorized By: _____

Release Date: _____

Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for Inductively Coupled Plasma

Project Name: Toftdahl Drums

LIMS Project ID: 2008-95

Sample: 95298031

Date Received: 07/19/95

Method: EPA200.7

Field ID: BEDOFF

Date Prepared: 07/21/95

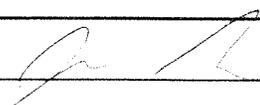
Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 07/26/95

Units: ug/L

Analyte	Result	Qualifier
Chromium	5	U
Copper	33.4	P
Zinc	4	U

Authorized By: 

Release Date: 8/1/95

Page:

1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Toftdahl Drums

LIMS Project ID: 2008-95

Sample: 95298032

Date Received: 07/19/95

Method: EPA200.7

Field ID: HOMALA

Date Prepared: 07/21/95

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 07/26/95

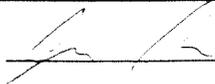
Units: ug/L

Analyte	Result	Qualifier
---------	--------	-----------

Chromium	5	U
----------	---	---

Copper	12	P
--------	----	---

Zinc	22	P
------	----	---

Authorized By: 

Release Date: 7/26/95

Page:

1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for Inductively Coupled Plasma

Project Name: Toftdahl Drums

LIMS Project ID: 2008-95

Sample: 95298033

Date Received: 07/19/95

Method: EPA200.7

Field ID: KYLE

Date Prepared: 07/21/95

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 07/26/95

Units: ug/L

Analyte	Result	Qualifier
---------	--------	-----------

Chromium	5	U
----------	---	---

Copper	31.9	P
--------	------	---

Zinc	19	P
------	----	---

Authorized By: 

Release Date: 

Page:

1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for Inductively Coupled Plasma

Project Name: Toftdahl Drums

LIMS Project ID: 2008-95

Sample: 95298034

Date Received: 07/19/95

Method: EPA200.7

Field ID: SMITH

Date Prepared: 07/21/95

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 07/26/95

Units: ug/L

Analyte	Result	Qualifier
---------	--------	-----------

Chromium	5	U
----------	---	---

Copper	34.8	P
--------	------	---

Zinc	21	P
------	----	---

Authorized By: _____

Release Date: 8/1/95

Page:

1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Toftdahl Drums

LIMS Project ID: 2008-95

Sample: 95298034 (Matrix Spike - LMX2) Date Received: 07/19/95 Method: EPA200.7

Field ID: SMITH Date Prepared: 07/21/95 Matrix: Water

Project Officer: Pam Marti Date Analyzed: 07/26/95 Units: % Recovery

Analyte	Result	Qualifier
---------	--------	-----------

Chromium	100	
----------	-----	--

Copper	109	
--------	-----	--

Zinc	101	
------	-----	--

Authorized By: [Signature]

Release Date: 7/26/95

Page: 3

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Lead

Project Name: Toftdahl Drums

LIMS Project ID: 2008-95

Project Officer: Pam Marti

Method: EPA239.2

Date Reported: 28-JUL-95

Matrix: Water

Analyte: Lead

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
95298030		BOONE	1.0	U	ug/L	07/19/95	07/27/95
95298031		BEDOFF	1.0	U	ug/L	07/19/95	07/27/95
95298032		HOMALA	1.0	U	ug/L	07/19/95	07/27/95
95298033		KYLE	1.0	U	ug/L	07/19/95	07/27/95
95298033	Matrix Spike		95 %			07/19/95	07/27/95
95298033	Matrix Spike		97 %			07/19/95	07/27/95
95298034		SMITH	1.0	U	ug/L	07/19/95	07/27/95
BLN52508		WPB2970	1.0	U	ug/L		
LCS52607		WLC2970	95 %				07/27/95

Authorized By: [Signature]

Release Date: 7/21/95

Page: 1